Title: Dynamics of photoexcited charge carriers in diamond

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Abstract: In this work we examine the luminescence from diamond in the strong excitation regime by one-photon or two-photon absorption of femtosecond laser beam. Measured sample was very pure type IIa diamond prepared by CVD method which was held in cryostat in order to measure temperature dependant luminescence in range from 12 K to 300 K. The signal was collected and analyzed either by spectrograph or streak camera so we gained time-integrated and time-resolved results. We analyzed only the part of the spectrum containing contributions from electron-hole liquid (for low temperatures), free excitons and probably exciton complexes. For higher temperatures where the condensation is not possible the contribution from e-h plasma was too weak compared to free excitons and was only detectable by time-resolved measurements. Other time-dependant results were obtained by pump and probe experiment with which we examined a change of life-times based on mode of excitation (one-photon or two-photon one) and also an influence of other beams on the condensation into electron-hole drops.

Keywords: CVD diamond, dynamics, e-h liquid, excitons